

CLAIMS

1. A process for activating a catalyst composition comprising at least one hydrogenation metal component of Group VI and/or Group VIII of the Periodic Table, and an S-containing organic additive, wherein the catalyst is contacted with hydrogen at a temperature between room temperature and about 600°C, and prior to or during the contacting with hydrogen the catalyst is contacted with an organic liquid.
2. The process of claim 1 wherein the contacting with the organic liquid takes place prior to the contacting with hydrogen.
3. The process of claim 1 wherein the organic liquid is a hydrocarbon with a boiling range of about 150-500°C.
4. The process of claim 3 wherein the organic liquid is selected from the group consisting of white oil, gasoline, diesel, gas oil, or mineral lube oil.
5. The process of claim 1 wherein the organic liquid comprises less than about 12 wt.% of oxygen.
6. The process of claim 1 wherein the organic liquid comprises less than about 8 wt.% of oxygen.
7. The process of claim 1 wherein the organic liquid comprises less than about 5 wt.% of oxygen.
8. The process of claim 1 wherein the organic liquid comprises less than about 2 wt.% of oxygen.

9. The process of claim 1 wherein the organic liquid comprises less than about 0.5 wt.% of oxygen.
- 5 10. The process of claim 1 wherein the organic liquid has an iodine number of about 50 or less.
11. The process of claim 1 wherein the organic liquid has an iodine number of about 30 or less.
- 10 12. The process of claim 1 wherein the organic liquid contains less than about 10 wt.% of sulfur.
13. The process of claim 1 wherein the organic liquid contains less than about 5 wt.% of sulfur.
- 15 14. The process of claim 1 wherein the amount of organic liquid contacted with the catalyst is about 20-500% of the catalyst pore volume which can be filled with the liquid under the conditions at which contact occurs.
- 20 15. The process of claim 1 wherein the contacting of the catalyst with hydrogen takes place at a temperature of about 100-450°C.
16. The process of claim 1 wherein the S-containing organic additive comprises at least one carbon atom and at least one hydrogen atom.
- 25 17. The process of claim 1 wherein the S-containing organic additive is an organic compound comprising a mercapto-group.
18. The process of claim 17 wherein the S-containing organic additive is a mercapto acid represented by the general formula HS-R1-COOR, wherein R1 stands for a divalent hydrocarbon group with 1-about 10 carbon atoms and R stands for a hydrogen atom, an alkali metal, an
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alkaline earth metal, ammonium, or a linear or branched alkyl group having 1 to about 10 carbon atoms.

- 5 19. The process of claim 1 wherein the S-containing organic additive comprises about 0.01-2.5 moles of additive per mole of hydrogenation metals present in the catalyst.
- 10 20. The process of claim 1 wherein the S-containing organic additive is incorporated into the catalyst composition prior to, subsequent to, or simultaneously with the incorporation of the hydrogenation metal components.
- 15 21. The process of claim 1 wherein the catalyst has a metal content in the range of about 0.1 to about 50 wt.% calculated as oxides on the dry weight of the catalyst not containing the organic additive.
22. The process of claim 1 wherein the Group VIB metal is present in an amount of about 5-40 wt.%, calculated as trioxide.
- 20 23. The process of claim 1 wherein the Group VIII metal is present in an amount of about 1- 10 wt.%, calculated as monoxide.
24. The process of claim 1 wherein the group VI metals are selected from Mo and/or W and the group VIII metals are selected from Co and/or Ni.
- 25 25. The process of claim 24 wherein the amount of sulfur incorporated into the catalyst by way of the S-containing organic additive is selected to correspond to about 50-300% of the stoichiometric sulfur quantity necessary to convert the hydrogenation metals into Co_9S_8 , MoS_2 , WS_2 , and/or Ni_3S_2 , respectively.
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26. The process of claim 1 wherein both the contacting with the organic liquid and the contacting with hydrogen are carried out *ex situ*.
- 5 27. The process of claim 1 wherein less than about 10% of the stoichiometric sulfur quantity necessary to convert the hydrogenation metals into their sulfides is provided by way of S-containing compound added to the hydrogen other than sulfur originating with the S-containing organic additive.
- 10 28. The process of claim 1 wherein less than about 5% of the stoichiometric sulfur quantity necessary to convert the hydrogenation metals into their sulfides is provided by way of S-containing compound added to the hydrogen other than sulfur originating with the S-containing organic additive.
- 15 29. The process of claim 1 wherein substantially none of the stoichiometric sulfur quantity necessary to convert the hydrogenation metals into their sulfides is provided by way of S-containing compound added to the hydrogen other than sulfur originating with the S-containing organic additive.
- 20 30. The process according to claim 29 wherein the catalyst is passivated after the *ex situ* hydrogen treatment.
- 25 31. A catalyst obtained by the process of claim 1.
32. A process for the hydrotreating of hydrocarbon feeds wherein the hydrocarbon feed is contacted with the catalyst obtained by the process of claim 1 at hydrotreating conditions.
- 30 33. The process of claim 32 wherein said hydrotreating conditions comprise a temperature in the range of about 250-450°C, a pressure in the range

of about 5-250 bar, a space velocity in the range of about 0,1-10 h⁻¹ and an H₂/oil ratio in the range of about 50-2000 NI/l.

Figure 1 consists of 12 histograms arranged in a single column. Each histogram represents the frequency distribution of the number of non-zero elements in the vector x for a specific value of n . The x-axis for all histograms is 'Number of non-zero elements in x ' with major ticks at 0, 20, 40, 60, 80, 100, and 120. The y-axis is 'Frequency' with major ticks at 0, 20, 40, 60, 80, and 100. The histograms are labeled with n values: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, and 120. The distributions are unimodal and centered at 0, with the peak frequency at 0 decreasing as n increases.